

Claims

1. An apparatus for installing an implant in a hollow body organ having a vessel wall, including:

5 means for transporting said implant into said hollow body organ;
 a removable expansion assembly releasably engageable with said implant;
 means for dilating said expansion assembly and expanding a portion of said
implant against said vessel wall;
 means for fastening said portion of said implant to said vessel wall of said
10 organ while said expansion assembly holds said portion against said vessel wall;
 means for collapsing said expansion assembly and releasing said portion of
said implant.

2. The apparatus of claim 1, wherein said implant comprises a tubular,
15 sleeve-like component.

3. The apparatus of claim 2, wherein said removable expansion assembly is
disposed to translate concentrically within said tubular, sleeve-like component.

4. The apparatus of claim 1, wherein said removable expansion assembly includes a plurality of peripheral struts, said struts extending parallel to a longitudinal axis and spaced angularly thereabout.

5 5. The apparatus of claim 4, wherein said peripheral struts include like proximal ends, said proximal ends being free of mechanical connection.

6. The apparatus of claim 5, wherein said peripheral struts include like distal ends, said distal ends being secured together.

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7. The apparatus of claim 5, wherein said removable expansion assembly includes means for compressing said peripheral struts along said longitudinal axis to effect bowing of said peripheral struts radially outwardly from said longitudinal axis.

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8. The apparatus of claim 7, wherein said means for compressing includes an end cap, said end cap including means for releasably impinging on said proximal ends of said peripheral struts.

9. The apparatus of claim 8, wherein said removable expansion assembly further includes a central strut extending parallel to said peripheral struts, said central strut being secured to said end cap.

5 10. The apparatus of claim 9, wherein said means for compressing includes means for translating said central strut distally to urge said end cap to impinge on said proximal ends of said peripheral struts and compress said peripheral struts axially.

10 11. The apparatus of claim 8, wherein said means for releasably impinging includes a recess formed in a distal surface of said end cap.

15 12. The apparatus of claim 5, further including means for translating said peripheral struts distally along said longitudinal axis to move said proximal ends of said peripheral struts distally with respect to said means for fastening said portion of said implant to said vessel wall.

20 13. The apparatus of claim 7, wherein said removable expansion assembly includes a confinement tube, said confinement tube having a lumen dimensioned to receive said peripheral struts in a non-expanded, collapsed state.

14. The apparatus of claim 13, wherein said confinement tube is
translatable with respect to said peripheral struts to move said confinement tube
selectively into concentric confinement of said peripheral struts.

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15. The apparatus of claim 2, wherein said tubular, sleeve-like component
includes at least one cuff formed at a proximal end thereof.

16. The apparatus of claim 15, wherein said means for transporting

10 includes a catheter assembly having a first tube.

17. The apparatus of claim 16, wherein said first tube includes a lumen
adapted to receive said tubular, sleeve-like component, said first tube having a
diameter dimensioned so that the proximal end of said first tube engages said cuff
15 in end-abutting relationship.

18. The apparatus of claim 17, wherein said tubular, sleeve-like component
is disposed in said lumen in a radially contracted state.

19. The apparatus of claim 17, wherein said catheter assembly includes a second tube disposed for axial translation concentrically within said first tube, said second tube having a proximal end dimensioned to engage the distal end of said tubular, sleeve-like component in end-abutting relationship.

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20. The apparatus of claim 2, wherein said tubular, sleeve-like component includes an axial opening therethrough that is free of any mechanical structure.

21. The apparatus of claim 2, wherein said tubular sleeve-like component

10 includes means for increased longitudinal stiffness.

22. The apparatus of claim 21, wherein said means for increased longitudinal stiffness includes a plurality of pleats extending longitudinally in said tubular, sleeve-like component.

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23. The apparatus of claim 21, wherein said means for increased longitudinal stiffness includes a plurality of stiffener struts secured longitudinally in said tubular, sleeve-like component.

24. The apparatus of claim 2, wherein said tubular, sleeve-like component includes at least one cuff formed at one end thereof.

25. The apparatus of claim 24, wherein said at least one cuff includes an
5 end portion of said tubular, sleeve-like component folded retroflexively to impinge on the exterior of said component.

26. The apparatus of claim 25, further including at least one reinforcing band incorporated in said at least one cuff.

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27. The apparatus of claim 26, wherein said at least one reinforcing band is resiliently biased to expand radially outwardly.

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28. The apparatus of claim 2, wherein said implant has a Y-configuration.

29. The apparatus of claim 28, wherein one branching end of said Y-configuration comprises an elongated tubular leg.

30. The apparatus of claim 28, wherein one branching end of said &-
20 configuration comprises a short connector leg.

31. The apparatus of claim 1, wherein said means for fastening includes a fastener member adapted to be inserted within said implant.

5 32. The apparatus of claim 31, further including at least one flexible tie connector extending from said fastener member.

10 33. The apparatus of claim 32, further including needle means for containing said fastener member and flexible tie connector, and means for driving said needle means through the exterior of said vessel wall to pierce said vessel wall and said implant.

15 34. The apparatus of claim 33, wherein said means for driving includes an endosurgical tool.

20 35. The apparatus of claim 33, further including push rod means for discharging said fastener member from said needle mean into the interior of said implant, said at least one flexible tie connector including an external portion extending from said fastener member exteriorly of said vessel wall.

36. The apparatus of claim 35, further including means for applying tensile force to said external portion of said at least one flexible tie connector, whereby said implant and said vessel wall are clamped together between said fastener member and said external portion of said at least one flexible tie connector.

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37. The apparatus of claim 36, wherein said means for applying tensile force include means for winding said at least one flexible tie connector about an winding axis.

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38. The apparatus of claim 37, wherein said means for winding includes a tool having a torque-limiting mechanism.

39. The apparatus of claim 37, wherein said means for winding includes an endosurgical tool.

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40. A removable expansion assembly for dilating a surgical implant within a hollow body organ, including:

a plurality of peripheral struts, said struts extending parallel to a longitudinal axis and spaced angularly thereabout;

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said plurality of peripheral struts being removably disposed within said surgical implant;

means for urging said peripheral struts to expand radially outwardly from said longitudinal axis, whereby said surgical implant is dilated.

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41. The removable expansion assembly of claim 40, wherein said peripheral struts include like proximal ends, said proximal ends being free of mechanical connection.

10 42. The removable expansion assembly of claim 41, wherein said peripheral struts include like distal ends, said distal ends being secured together.

15 43. The removable expansion assembly of claim 41, wherein said means for urging said peripheral struts includes means for compressing said peripheral struts along said longitudinal axis to effect bowing of said peripheral struts radially outwardly from said longitudinal axis.

20 44. The removable expansion assembly of claim 43, wherein said means for compressing includes an end cap, said end cap including means for releasably impinging on said proximal ends of said peripheral struts.

45. The removable expansion assembly of claim 44, further including a central strut extending parallel to said peripheral struts, said central strut being secured to said end cap.

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46. The removable expansion assembly of claim 45, further including means for translating said central strut distally to urge said end cap to impinge on said proximal ends of said peripheral struts and compress said peripheral struts axially.

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47. The removable expansion assembly of claim 44, wherein said means for releasably impinging includes a recess formed in a distal surface of said end cap.

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means for translating said peripheral struts distally along said longitudinal axis to move said proximal ends of said peripheral struts distally with respect to said end cap.

49. The removable expansion assembly of claim 40, further including a confinement tube, said confinement tube having a lumen dimensioned to receive said peripheral struts in a non-expanded, radially-collapsed state.

5 50. The removable expansion assembly of claim 49, wherein said confinement tube is translatable with respect to said peripheral struts to move said confinement tube selectively into concentric confinement of said peripheral struts.

10 51. A fastening assembly for joining a surgical implant to a hollow body organ having a vessel wall, including:
 a fastener member adapted to be inserted within said implant;
 at least one flexible tie connector extending from said fastener member;
 needle means for containing said fastener member and flexible tie connector, and means for driving said needle means through the exterior of said vessel wall to pierce said vessel wall and said implant;
 means for applying tensile force to an external portion of said at least one flexible tie connector, whereby said implant and said vessel wall are clamped together between said fastener member and said external portion of said at least one flexible tie connector.

52. The fastening assembly of claim 51, further including push rod means for discharging said fastener member from said needle mean into the interior of said implant.

5 53. The fastening assembly of claim 51, wherein said means for driving includes an endosurgical tool.

10 54. The fastening assembly of claim 51, wherein said means for applying tensile force include means for winding said at least one flexible tie connector about an winding axis.

15 55. The fastening assembly of claim 54, wherein said means for winding includes a tool having a torque-limiting mechanism.

20 56. The fastening assembly of claim 54, wherein said means for winding includes an endosurgical tool.

25 57. The fastening assembly of claim 51, further including pressure distribution means secured to said exterior of said vessel wall, said at least one tie connector extending through said pressure distribution means, said means for

applying tensile force being disposed externally of said pressure distribution means.

58. The fastening assembly of claim 57, wherein said pressure distribution
means includes a ring having a generally C-shaped configuration.

59. The fastening assembly of claim 57, wherein said pressure distribution
means includes a strap having a generally omega-shaped configuration.